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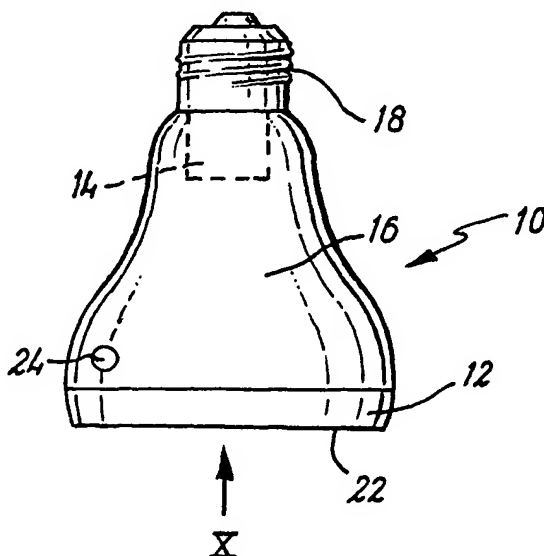
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(54) Title: LIGHTING UNITS



(57) Abstract: A lighting unit (10) for providing emergency or back-up lighting, comprising a light source (12), and a power source (14). The unit (10) is mountable in a light bulb socket or the like to provide a replacement for a conventional light bulb. The unit (10) functions to provide light in similar manner to a conventional light bulb when the usual, mains electricity supply is provided to the socket. However, upon failure of the electricity supply to the unit (10) means within the unit enables the power source (14) of the unit to power the light source (12) whereby the unit (10) provides light, for instance as part of an emergency or back-up lighting system.

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### Lighting Units

The present invention relates to lighting units, and particularly but not exclusively to lighting units for providing emergency lighting.

Emergency lighting is installed in many environments such as public and private buildings and public vehicles to provide lighting in the event that the usual lighting fails. Known emergency lighting is usually strategically placed as part of a system comprising large central back-up power units, generators and other arrangements to power the emergency lighting in the event of failure of the main power supply. Known emergency lighting systems are expensive to fit and maintain and the requirement for large back-up power sources to power the systems presents significant disadvantages and moreover can inhibit the flexibility of such systems.

An important disadvantage of known emergency lighting systems is vulnerability should the central back-up power source fail or be damaged, for example by fire, flood or the like.

According to the present invention there is provided a lighting unit comprising a light source, means to mount the unit for connection to an external power supply and a power source operable to power the light source upon failure of the external power supply.

Preferably the means enables the unit to be mounted in known designs of light fittings, such as fittings for light bulbs and lighting tubes, whereby the lighting unit may be used to replace conventional lighting such as bulbs and tubes to provide for back-up lighting should the external power supply fail.

Preferably the means electrically connects the unit to an external power supply which power supply may power the unit. The means may comprise a fitting connector preferably of conventional type, such as bayonet, threaded (Edison screw), twin pin, etc. to enable the unit to be electrically mounted in

known designs and type of light fittings.

Preferably the unit comprises control means which enables the unit to be powered by an external power supply connected thereto, for instance mains electricity supply, and which upon failure of the said external power supply thereto enables the power source to power the light source.

Preferably the lighting unit houses the light source and power source to have an external appearance substantially similar to known lighting units.

Further means may be provided which enables the unit to operate under various external power supply conditions. For example, mains supply voltages vary between countries and circuitry may be provided within the unit to enable the unit to operate under variable voltage supplies.

The unit may further comprise indicator means to indicate that the power source is operable. The power source may be chargeable by the external supply and means may be provided to indicate that the power source is, is being and/or has been charged by the external power supply. The indicator means may provide visible indication observable from the exterior of the unit.

The unit may comprise a base to which the light source is removably attached. The base may comprise the power source and preferably also the aforesaid means, control means and/or further means.

The light source may be attachable to the base by a connection similar to the means for mounting the unit for connection to an external power supply.

Seal means may be provided to seal attachment of the light source to the base.

The power source may be selectively removable from the unit. The means may be detachable from the base.

The unit may further comprise an audio device operable to sound upon activation of the power source whereby to alert to activation.

Further according to the present invention there is provided an emergency lighting system comprising one or more lighting units as described in any of the preceding paragraphs.

Still further according to the present invention there is provided an emergency lighting system comprising a plurality of lighting units each of which comprises an independent power source to power the unit upon detection of failure of an external power supply.

Preferred embodiments of the present invention will now be described by way of example only, with reference to the accompanying drawings in which:-

Fig. 1 is a side view of a lighting unit according to the present invention;

Fig. 2 is a side view of a lighting unit according to the second embodiment of the present invention;

Fig. 3 is a side view of a lighting unit according to a third embodiment of the present invention;

Fig. 4 is a side view of a lighting unit according to a fourth embodiment of the present invention;

Fig. 5 is a side view of a lighting unit according to a fifth embodiment of the present invention;

Fig. 6 is a side view of a lighting unit according to a sixth embodiment of the present invention;

Fig. 7 is a side view of a lighting unit according to a seventh embodiment

of the present invention;

Fig. 8 is a side view of a lighting unit according to an eighth embodiment of the present invention;

Fig. 9 is an exploded side view of a lighting unit according to a ninth embodiment of the present invention;

Fig. 10 is a view in the direction of arrow X of Fig. 1;

Fig. 11 is a view in the direction of arrow X1 of Fig. 2;

Fig. 12 is a side view of a lighting unit according to a tenth embodiment of the present invention; and

Fig. 13 is a side view of a lighting unit according to the eleventh embodiment of the present invention.

Referring to the drawings there is provided a lighting unit 10 comprising a light source 12 and a power source 14 operable to power the light source 12 upon failure of an external power supply (not shown).

Referring to Fig. 1, a lighting unit 10 according to a first embodiment comprises a body 16 at one end of which is located a screw thread fitting 18 of conventional design for connection of the unit 10 to a socket or holder (not shown) of conventional design.

The unit 10 of Fig. 1 has an overall appearance of a conventional luminaire or light bulb. The power source 14 is located within the body 16 for use as will be explained.

Also provided within the unit 10 but not shown in the figures, is circuitry which provides for activation of the power source 14 to power the light source

12 upon detection of failure of an external power supply, again as will be explained.

In the embodiment shown in Fig. 1, the light source 12 comprises an array of light emitting diodes 20 (Fig. 10) which are connected to the fitting 18 whereby to be powered by an external power supply to a socket or holder in which the unit 10 is mounted. A protective cover 22 is provided over the LEDs.

The power source 14 comprises one or more batteries which are connected to the external power supply when the unit 10 is connected thereto so as to be charged thereby to maintain the power source operable. An indicator light 24 is provided on the outside of the body 16 to indicate to an observer of the unit 10 that the battery or batteries 14 are fully charged and operable and/or are being actively charged.

In use, the unit 10 is mounted in a conventional lamp socket or holder in place of a conventional light bulb, tube or the like. When the usual, external power supply to the unit 10 is functioning satisfactorily, the light source 12 within the unit is powered by the external power supply such that the unit 10 provides light like a conventional light bulb.

In the event of failure of the external power supply the said circuitry within the unit activates the powering of the light source 12 by the power source 14 within the unit 10.

The unit 10 therefore provides emergency, back-up lighting in the event of the failure of the main, external power supply.

It would be usual for a plurality of units 10 to be strategically placed throughout a building or other environment in which the emergency light back-up is required, such that upon failure of the external power supply, appropriate back-up lighting is provided, for example to light up an escape route from within a building.

It will be appreciated that the unit 10 of the present invention has significant advantage over conventional emergency lighting. There is no need for large, remotely located power sources or generators to be provided to provide the emergency back-up power supply. Further, the present invention provides for considerably greater flexibility in that selected conventional lighting units can be replaced by units of the present invention without any requirement for modified or additional wiring and the like. Further, the appearance of the units 10 of the present invention are the same or closely resemble conventional lighting units, such that the presence of the emergency lighting facility is not apparent.

Fig. 2 shows a unit 110 according to a second embodiment. The unit 110 also comprises a power source 114, a body 116 and a light source 112. The fitting 118 of the unit 110 is a conventional bayonet-type fitting. A light indicator 124 is also provided.

The light source 112 comprises a linear light source, such as cold cathode tube, fluorescent tube, xenon lamp or indeed any other appropriate light source. The tube is mounted between appropriate holders 28 (Fig. 11). A protective cover 122 is provided to protect the tube 26. The cover may be removable to allow selective replacement of the tube 26, and a seal 30 may be provided to seal the cover 122 in place.

Fig. 3 shows a unit 210 according to a third embodiment of the present invention. The unit 210 illustrates the provision of a two-pin fitting 218 in the present invention.

Figs. 4 and 5 show further embodiments of units 310, 410 with two pin fittings 318 and 418 according to the present invention. The units 310, 410 comprise lenses 32 on the respective fronts thereof.

Referring to Fig. 6 a unit 510 according to a sixth embodiment of the present invention comprises a screw thread fitting 518 and a generally elongate,

cylindrical body 506.

With reference to Fig. 7, the lighting unit 610 according to a seventh embodiment comprises an elongate low-energy tube with a light source 612. The tube 612 may comprise a fluorescent/phosphorescent gas according to known technology. The fitting 618 is of conventional bayonet-type fitting.

The unit 710 as shown in Fig. 8 comprises a light source 712 comprising a tube 726 mounted between respective holders 728. The other features are similar to previous embodiments.

The above embodiments comprise similar features within the unit as described with reference to the first embodiment, and corresponding reference numerals have been used to refer thereto, prefixed with integers according to the particular embodiment.

Fig. 9 shows a unit 810 according to a ninth embodiment of the present invention. The unit 810 comprises a body 816 to which is removeably attachable a power source 814. As in the previous embodiments, the power source 814 may be one or more batteries.

The fitting 818 is shown as a screw-thread fitting which is removeably attachable to the body 816 by a two-pin connection 34. A light indicator 824 is provided on the body 816.

The light source 812 is removeably mountable to the body 816 via a screw thread attachment 36 which comprises a male attachment part 36a on the light source 812 and a female part 36b on the body 816. The connection 34 and attachment 36 provide for electrical connection and attachment. A seal 38 is provided to seal between the body 816 and the light source 812.

The light source 812 comprises an array of LEDs 820 provided around a concave surface 40 over which is mounted a removable protective cover 822



and a lens 832.

In this embodiment an audible sounding device 42 is provided on the unit 810 which device is activated when the power source 814 powers the light source 812, whereby to give an audible signal of the state of the unit 810.

The provision of a detachable fitting 818 and detachable light source 812 provides for greater flexibility in the application of lighting units according to the present invention. For example, the removable fittings 818 may be of a variety of designs, i.e. screw thread (Edison screw), bayonet fitting, pin fitting, etc. This enables appropriate fittings 818 to be selected to enable the unit to be fitted to a particular type of lamp socket or holder. The connection 34 which is shown as a two-pin connection can be standard between the body 816 and the fittings 818, such that a single body 816 can then be used for connection to different types and design of holders and sockets.

The provision of the removable power source 814 which can be located and removed without dismantling the unit 810 facilitates ease of maintenance.

Fig. 12 shows a further unit 910 which comprises an elongate body 916 at opposite ends of which are provided fittings 918 which fittings are known two-pin fittings for fluorescent tubes and such like. The unit 910 can be fitted into known designs of light fitment for such tubes. The unit 910 comprises a power source 914 which may be removable and a light source 912 in the form of an array of LEDs 920. A protective cover 922 protects the LED. A light indicator 924 and an audio device 942 are provided, to operate in similar fashion as described above.

A similar unit 1010 is shown in Fig. 13. In this embodiment however the light source is a tube 1026 located between holders 1028. The fittings 1018 on each end of the unit 1010 are conventional push fit fittings often found on fluorescent tubes and halogen bulbs, enabling the unit 1010 to mount into existing tube holders whereby to be able to replace conventional tubes in

accordance with the invention.

It will be appreciated from the numerous embodiments exemplified herein that the range of lighting units falling within the scope of the present invention are many and it will be appreciated that any of the features discussed above can be provided in any or all and interchanged between the *embodiments* described above.

Various modifications may be made without departing from the spirit or scope of the present invention.

The external power supply generally used to power lighting units vary from country to country and location to location. Lighting units of the present invention can comprise circuitry that enables adjustment either manually or automatically to enable the units to operate satisfactorily under various external power supplies. Automatic adjustment provides for greater flexibility and application. The light units may comprise inverters to generate alternating current frequencies and/or preferred voltages for certain types of light source.

It will be appreciated that the fittings of the units of the invention may be of any type but it is a significant advantage of the present invention that units are mountable in existing, conventional luminaire holders or sockets for light bulbs, tubes, etc., and therefore it is preferred that the fittings are of any known type, such as screw caps including small and giant Edison screw cap, bayonet fittings both large and small, two-pin fittings, three-pin fittings and such like. This enables existing lighting systems to be converted to include an emergency/back-up lighting facility simply by replacing some or all of the existing light bulbs, tubes, etc., with lighting units according to the present invention.

Whilst endeavouring in the foregoing specification to draw attention to those features of the invention believed to be of particular importance it should be understood that the Applicant claims protection in respect of any patentable feature or combination of features hereinbefore referred to and/or shown in the

drawings whether or not particular emphasis has been placed thereon.

Claims

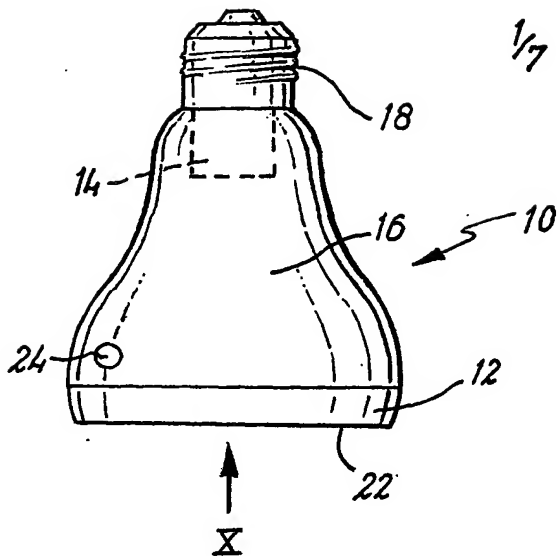
1. A lighting unit comprising a light source, means to mount the unit for connection to an external power supply and a power source operable to power the light source upon failure of the external power supply.
2. A lighting unit as claimed in claim 1, in which the means enables the unit to be mounted in known designs of light fittings, such as fittings for light bulbs and lighting tubes.
3. A lighting unit as claimed in claim 2, in which the lighting unit is used to replace conventional lighting such as bulbs and tubes to provide for back-up lighting should the external power supply fail.
4. A lighting unit as claimed in any preceding claim, in which the means electrically connects the unit to an external power supply.
5. A lighting unit as claimed in claim 4, in which the power supply powers the unit.
6. A lighting unit as claimed in any preceding claim, in which the means comprises a fitting connector of conventional type, such as bayonet, threaded (Edison screw), twin pin, etc. to enable the unit to be electrically mounted in known designs and type of light fittings.
7. A lighting unit as claimed in any of claims 4 to 6, in which the unit comprises control means which enables the unit to be powered by an external power supply connected thereto, for instance mains electricity supply, and which upon failure of the said external power supply thereto enables the power source to power the light source.
8. A lighting unit as claimed in any preceding claim, in which the lighting unit houses the light source and power source to have an external appearance

substantially similar to known lighting units.

9. A lighting unit as claimed in any preceding claim, in which further means is provided which enables the unit to operate under various external power supply conditions.
10. A lighting unit as claimed in claim 9, in which the further means may comprise circuitry within the unit to enable the unit to operate under variable voltage supplies.
11. A lighting unit as claimed in any preceding claim, in which the unit comprises indicator means to indicate that the power source is operable.
12. A lighting unit as claimed in any preceding claim, in which the power source is chargeable by the external supply.
13. A lighting unit as claimed in claim 11 or claim 12, in which means is provided to indicate that the power source is, is being and/or has been charged by the external power supply.
14. A lighting unit as claimed in any of claims 11 to 13, in which the indicator means provides visible indication observable from the exterior of the unit.
15. A lighting unit as claimed in any preceding claim, in which the unit comprises a base to which the light source is removably attached.
16. A lighting unit as claimed in claim 15, in which the base comprises the power source.
17. A lighting unit as claimed in claim 15 or claim 16, in which the base contains the aforesaid means, control means and/or further means.

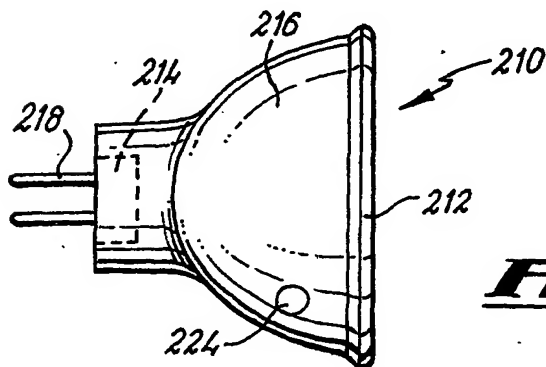
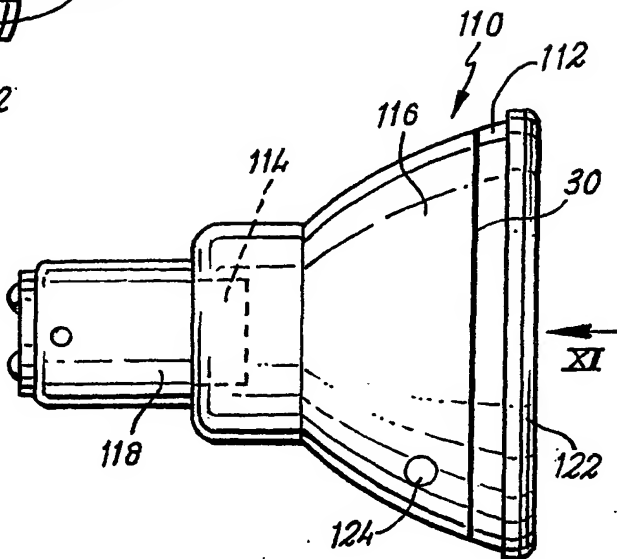
18. A lighting unit as claimed in any of claims 15 to 17, in which the light source is attachable to the base by a connection similar to the means for mounting the unit for connection to an external power supply.
19. A lighting unit as claimed in claim 18, in which seal means is provided to seal attachment of the light source to the base.
20. A lighting unit as claimed in any preceding claim, in which the power source is selectively removable from the unit.
21. A lighting unit as claimed in any preceding claim, in which the means is detachable from the base.
22. A lighting unit as claimed in any preceding claim, in which the unit comprises an audio device operable to sound upon activation of the power source whereby to alert to activation.
23. A lighting system comprising one or more lighting units as defined in any one or more of the preceding claims.
24. A lighting system comprising a plurality of lighting units each of which comprises an independent power source to power the unit upon detection of failure of an external power supply.
25. A lighting system as claimed in claim 24, in which one or more of the lighting units is as defined in any one or more of claims 1 to 22.
26. A lighting unit substantially as hereinbefore described with reference to any one or more of the accompanying drawings.
27. A lighting system substantially as hereinbefore described with reference to any one or more of the accompanying drawings.

28. Any novel subject matter or combination including novel subject matter disclosed herein, whether or not within the scope of or relating to the same invention as any of the preceding claims.



***Fig. 1***

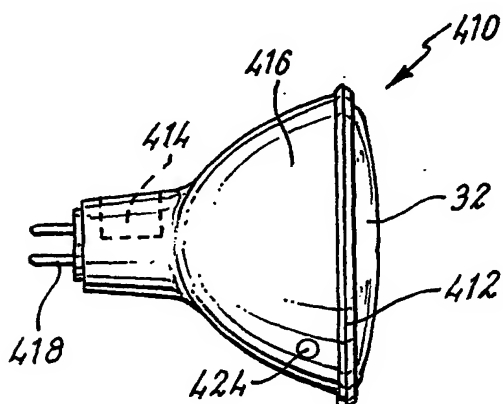
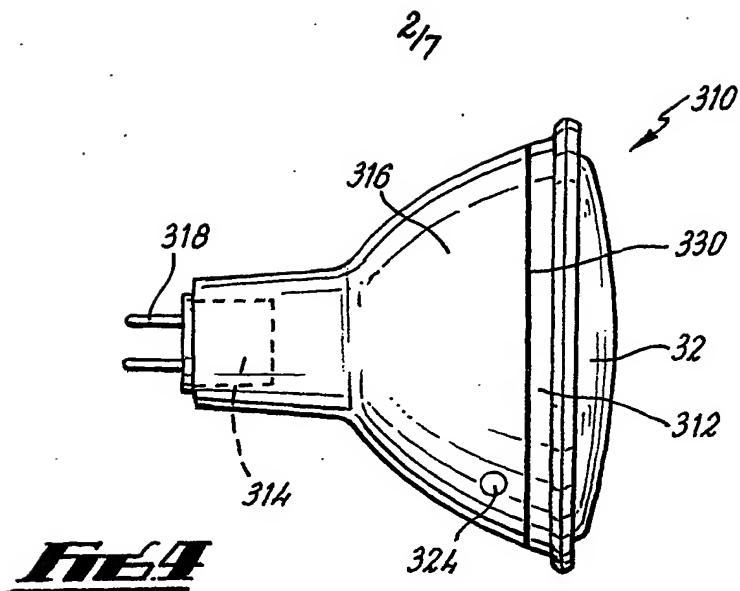
***Fig. 2***

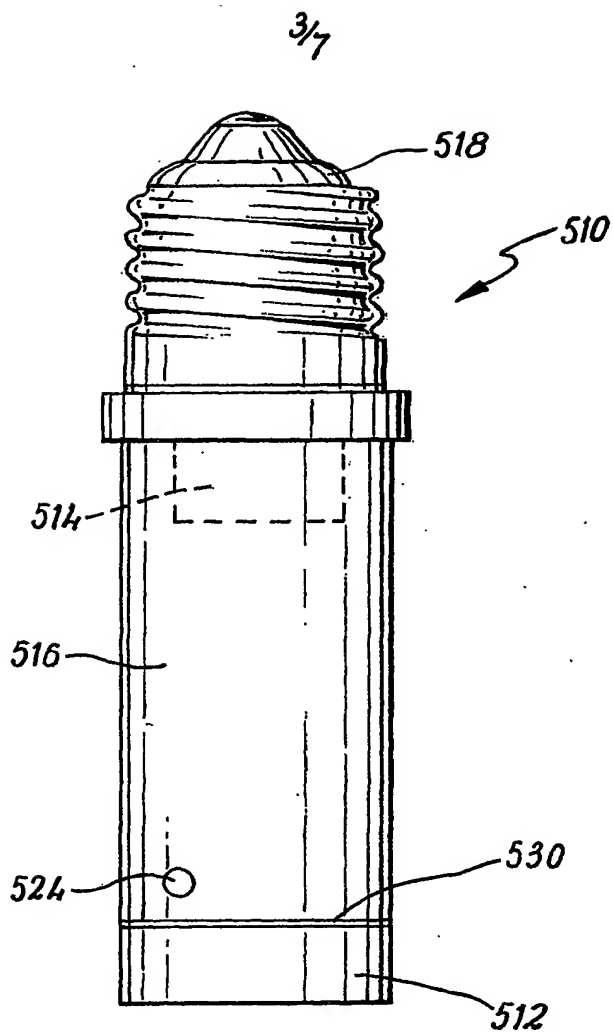


***Fig. 3***

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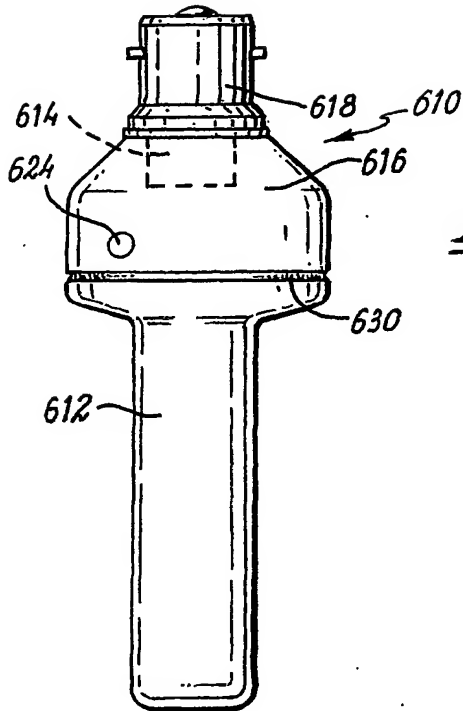




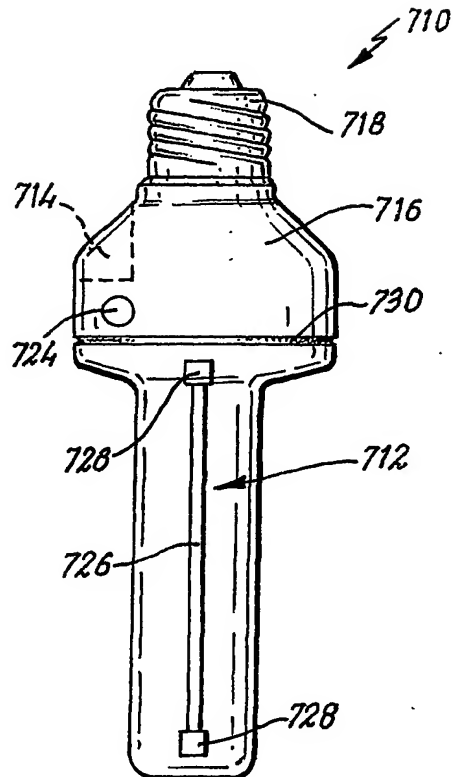


**FE 6**

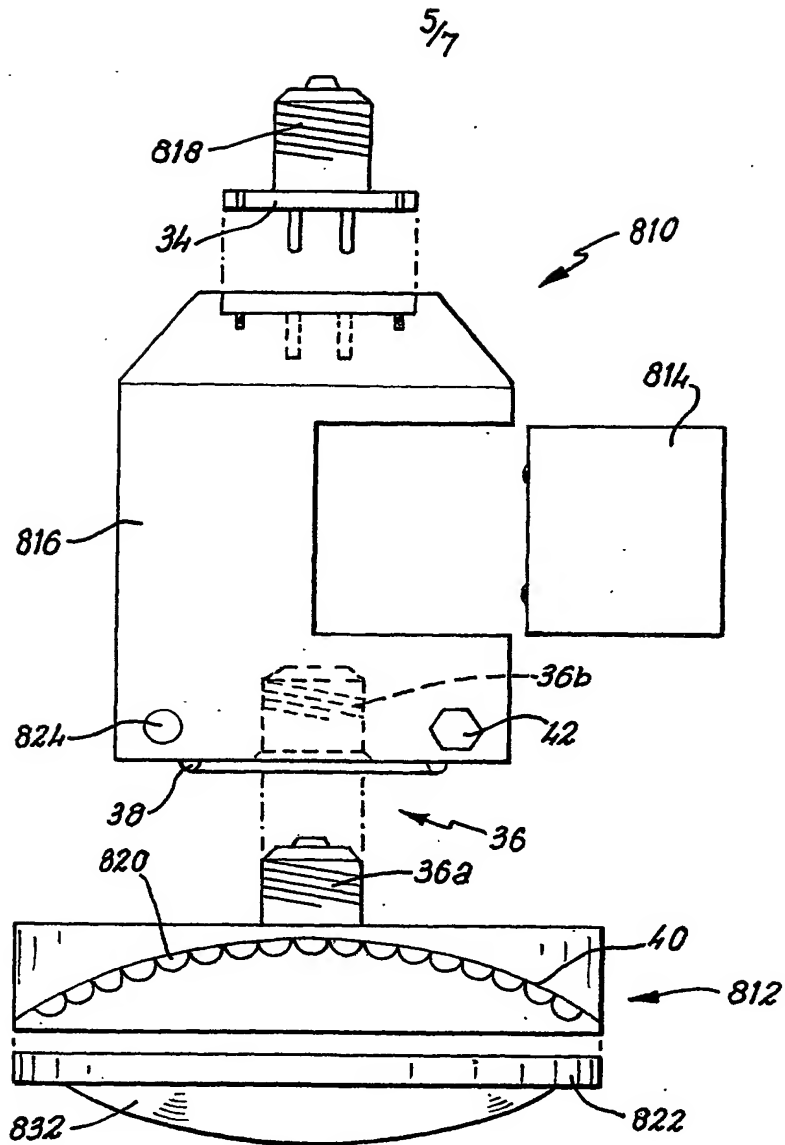
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**Fig. 7**

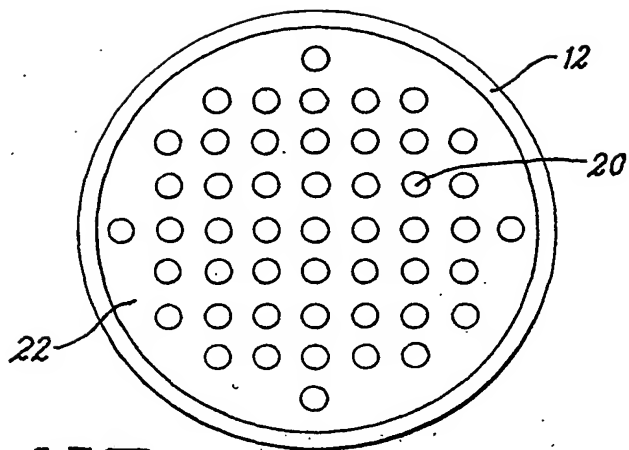


**Fig. 8**

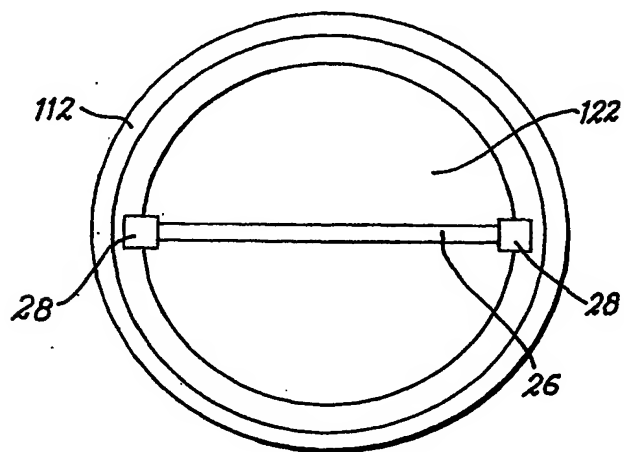


***FIG. 9***

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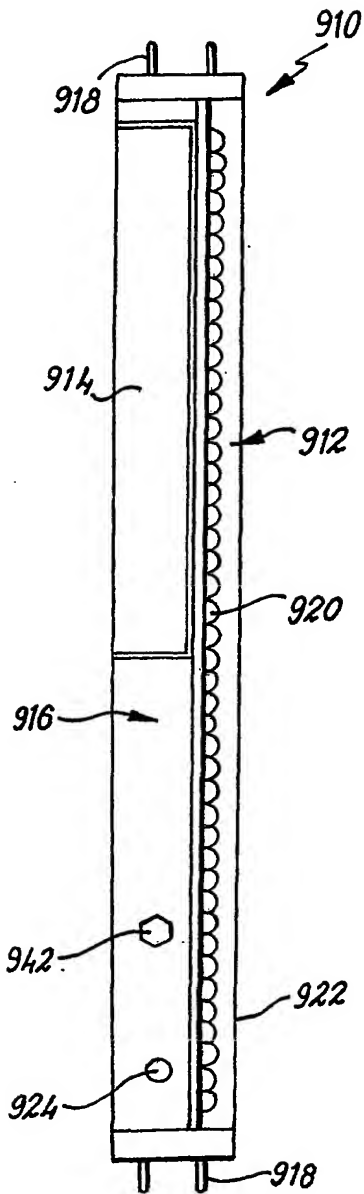


**FIG 10**

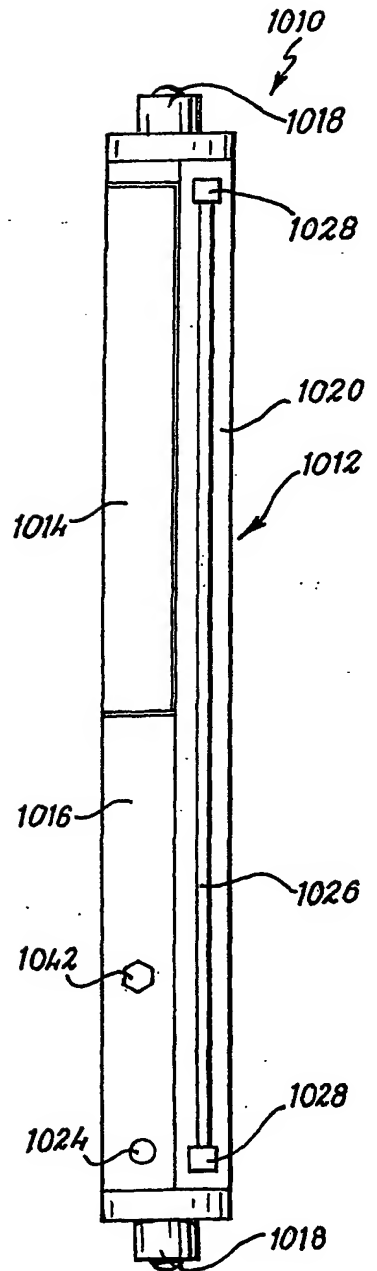


**FIG 11**

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***FIG 12***



***FIG 13***

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<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC 7 F21S9/02 F21Y101/02		
According to International Patent Classification (IPC) or to both national classification and IPC		
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the International search (name of data base and, where practical, search terms used) EPO-Internal, WPI Data, PAJ		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
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Y	---	9-28
X	DE 85 34 100 U (MARKWARD MANFRED) 15 May 1986 (1986-05-15) the whole document	1,6,8
A	---	1
Y	FR 2 082 535 A (PIROUX JEAN) 10 December 1971 (1971-12-10) page 4, line 27-39; figures 1-4	9,10
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<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <span style="margin-left: 100px;"><input checked="" type="checkbox"/> Patent family members are listed in annex.</span>		
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Date of the actual completion of the international search  <div style="text-align: center; font-weight: bold;">24 July 2001</div>		Date of mailing of the international search report  <div style="text-align: center; font-weight: bold;">31/07/2001</div>
Name and mailing address of the ISA European Patent Office, P.O. 5016 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax. (+31-70) 340-3016		Authorized officer  <div style="text-align: center; font-weight: bold;">Busto, M</div>

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International Application No.

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Form PCT/ISA/210 (continuation of second sheet) (July 1992)



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